

IN THE CLAIMS:

Please **AMEND** elected claims 2, 4, 10, 11, 12, 14, 29, 32, 33, 36 and 37 and **ADD** claims 41 and 42 as follows:

1. (CANCELED)

2. (CURRENTLY AMENDED) An electrolyte for a lithium-sulfur battery having a positive and negative electrode, comprising:
 - a first solvent having a dielectric constant that is greater than or equal to 20;
 - a second solvent having a viscosity that is less than or equal to 1.3 cP; and
 - an electrolyte salt,
 wherein:
 - said first solvent is at least one selected from a group consisting of methanol, hexamethyl phosphoramidate, ethanol, and isopropanol, and
 - the first solvent is roughly between 20% and 80% by volume of the electrolyte.

3. (WITHDRAWN) The electrolyte for the lithium-sulfur battery of claim 2, wherein said second solvent is at least one selected from a group consisting of methylethyl ketone, pyridine, methyl formate, n-propyl acetate, ethyl ether, methylethyl carbonate, toluene, fluorotoluene, benzene, fluorobenzene, p-dioxane, and cyclohexane.

4. (CURRENTLY AMENDED) A lithium-sulfur battery comprising:
 - a positive electrode including an active material including lithium;
 - a negative electrode having another active material including sulfur; and
 - an electrolyte disposed between the positive and negative electrodes, the electrolyte comprising:
 - a first solvent having a dielectric constant that is greater than or equal to 20;
 - a second solvent having a viscosity that is less than or equal to 1.3 cP; and
 - an electrolyte salt,
 wherein:
 - the first solvent is ~~less than 30% and at or greater than 20%~~ between 20% inclusively and 30% by volume of the electrolyte, and

the second solvent is roughly between 80% and about 60% by volume of the electrolyte.

5. (WITHDRAWN) The lithium-sulfur battery of claim 4, wherein the electrolyte further comprises an additive that forms a solid electrolyte interface (SEI) at a surface of the negative electrode during charging.

6. (WITHDRAWN) The lithium-sulfur battery of claim 5, wherein said additive is at least one selected from a group consisting of vinylene carbonate, vinylene trithiocarbonate, ethylene trithiocarbonate, ethylene sulfite, ethylene sulfide and bismuth carbonate.

7. (WITHDRAWN) The lithium-sulfur battery of claim 5, wherein said additive is roughly between 0.2% and 10% by weight of the electrolyte.

8. (PREVIOUSLY PRESENTED) The lithium-sulfur battery of claim 4, wherein said electrolyte salt is at least one selected from a group consisting of lithium hexafluorophosphate (LiPF_6), lithium tetrafluoroborate (LiBF_4), lithium hexafluoroarsenate (LiAsF_6), lithium perchlorate (LiClO_4), lithium trifluoromethane sulfonyl imide ($\text{LiN}(\text{CF}_3\text{SO}_2)_2$), and lithium trifluorosulfonate ($\text{CF}_3\text{SO}_3\text{Li}$).

9. (PREVIOUSLY PRESENTED) The lithium-sulfur battery of claim 4, wherein a concentration of said electrolyte salt is roughly between 0.5 M and 2.0 M.

10. (CURRENTLY AMENDED) A lithium-sulfur battery comprising:
a negative electrode comprising a negative active material selected from a group consisting of lithium metal, lithium-containing alloy, a combination electrode of a lithium/inactive sulfur, a compound that can reversibly intercalate lithium ion, and a compound that can reversibly redoxdate with a lithium ion at a surface;

an electrolyte comprising a first solvent having a dielectric constant that is greater than or equal to 20, a second solvent having a viscosity that is less than or equal to 1.3 cP, and an electrolyte salt; and

a positive electrode comprising a positive active material comprising at least one sulfur-based material selected from a group consisting of a sulfur element, Li_2S_n ($n \geq 1$), an organic

sulfur compound, and a carbon-sulfur polymer $((C_2S_x)_n$ where $x=2.5$ to 50 and $n \geq 2$), and an electrically conductive material,

wherein

the first solvent is roughly between 20% and 40% by volume of the electrolyte,

and

the second solvent is roughly between 80% and about 60% by volume of the electrolyte.

11. (CURRENTLY AMENDED) A lithium-sulfur battery comprising:
a positive electrode including an active material including lithium;
a negative electrode including another active material including sulfur; and
an electrolyte disposed between the positive and negative electrodes, the electrolyte comprising

a first solvent having a polarity high enough to dissolve an ionic compound;
a second solvent having a viscosity that is less than or equal to 1.3 cP; and
an electrolyte salt,

wherein

the first solvent is between 20% inclusively and 30% ~~less than 30% and at or greater than 20%~~ by volume of the electrolyte, and

the second solvent is roughly between 80% and about 60% by volume of the electrolyte.

12. (CURRENTLY AMENDED) A lithium-sulfur battery comprising:
a negative electrode comprising a negative active material including sulfur;
an electrolyte comprising

a first solvent having a polarity high enough to dissolve an ionic compound,
a second solvent having a viscosity that is less than or equal to 1.3 cP, and
an electrolyte salt; and

a positive electrode comprising a positive active material including lithium,

wherein

the first solvent is roughly between 20% and 40% by volume of the electrolyte,

and

the second solvent is ~~more than 70% and at or less than 80%~~ between 70% and 80% inclusively by volume of the electrolyte.

13. (ORIGINAL) The lithium-sulfur battery of claim 12, wherein the first solvent has a dielectric constant that is greater than or equal to 20.

14. (CURRENTLY AMENDED) A lithium-sulfur battery comprising:
a negative electrode comprising a negative active material;
an electrolyte comprising
 a first solvent having a polarity high enough to dissolve an ionic compound,
 a second solvent having a viscosity that is less than or equal to 1.3 cP, and
 an electrolyte salt; and
a positive electrode comprising a positive active material,
wherein:
 the first solvent is at least one selected from a group consisting of methanol, hexamethyl phosphoramidate, ethanol, and isopropanol,
 the first solvent is roughly between 20% and 80% by volume of said electrolyte,
and
 the second solvent is roughly between 20% and about 80% by volume of said electrolyte.

15. (WITHDRAWN) The lithium-sulfur battery of claim 14, wherein the second solvent is at least one selected from a group consisting of methylethyl ketone, pyridine, methyl formate, n-propyl acetate, ethyl ether, methylethyl carbonate, toluene, fluorotoluene, benzene, fluorobenzene, p-dioxane, and cyclohexane.

16. (PREVIOUSLY PRESENTED) The lithium-sulfur battery of claim 14, wherein:
the first solvent is roughly between 20% and 40% by volume of said electrolyte, and
the second solvent is roughly between 80% and about 60% by volume of said electrolyte.

17. (PREVIOUSLY PRESENTED) The lithium-sulfur battery of claim 14, wherein a ratio of the first solvent to the second solvent is roughly 1:1.

18. (WITHDRAWN) The lithium-sulfur battery of claim 12, wherein said electrolyte further comprises an additive that prevents the formation of dendrite on a surface of said negative electrode during charging.

19. (WITHDRAWN) The lithium-sulfur battery of claim 18, wherein the additive forms a solid electrolyte interface (SEI) at the surface of said negative electrode.
20. (WITHDRAWN) The lithium-sulfur battery of claim 18, wherein the additive is at least one selected from a group consisting of vinylene carbonate, vinylene trithiocarbonate, ethylene trithiocarbonate, ethylene sulfite, ethylene sulfide and bismuth carbonate.
21. (WITHDRAWN) The lithium-sulfur battery of claim 18, wherein the additive is roughly between 0.2% and 10% by weight of said electrolyte.
22. (WITHDRAWN) The lithium-sulfur battery of claim 10, further comprising an additive that forms a solid electrolyte interface (SEI) at a surface of the negative electrode during charging.
23. (WITHDRAWN) The lithium-sulfur battery of claim 22, wherein said additive is at least one selected from a group consisting of vinylene carbonate, vinylene trithiocarbonate, ethylene trithiocarbonate, ethylene sulfite, ethylene sulfide and bismuth carbonate.
24. (WITHDRAWN) The lithium-sulfur battery of claim 23, wherein said electrolyte salt is at least one selected from a group consisting of lithium hexafluorophosphate (LiPF_6), lithium tetrafluoroborate (LiBF_4), lithium hexafluoroarsenate (LiAsF_6), lithium perchlorate (LiClO_4), lithium trifluoromethane sulfonyl imide ($\text{LiN}(\text{CF}_3\text{SO}_2)_2$), and lithium trifluorosulfonate ($\text{CF}_3\text{SO}_3\text{Li}$).
25. (WITHDRAWN) The electrolyte for the lithium-sulfur battery of claim 3, wherein said first solvent is sulfolane, and said second solvent is the toluene.
26. (WITHDRAWN) The electrolyte for the lithium-sulfur battery of claim 3, wherein said first solvent is sulfolane, and said second solvent is the n-propyl acetate.
27. (WITHDRAWN) The lithium-sulfur battery of claim 15, wherein said first solvent is sulfolane, and said second solvent is the toluene.

28. (WITHDRAWN) The lithium-sulfur battery of claim 15, wherein said first solvent is sulfolane, and said second solvent is the n-propyl acetate.

29. (CURRENTLY AMENDED) The lithium-sulfur battery of claim 4, wherein the first solvent is at least one selected from a group consisting of ethylene carbonate, propylene carbonate, dimethyl sulfoxide, ~~sulfolane~~sulfolane, γ-butyrolactone, acetonitrile, dimethyl formamide, methanol, hexamethyl phosphoramidate, ethanol, and isopropanol.

30. (PREVIOUSLY PRESENTED) The lithium-sulfur battery of claim 4, wherein the second solvent is at least one selected from a group consisting of methylethyl ketone, pyridine, methyl formate, tetrahydrofuran, diglyme (2-methoxyethyl ether), 1,3-dioxolane, methyl acetate, 2-methyl tetrahydrofuran, ethyl acetate, n-propyl acetate, ethyl propionate, methyl propionate, ethyl ether, diethyl carbonate, methylethyl carbonate, dimethyl carbonate, toluene, fluorotoluene, 1,2-dimethoxy ethane, benzene, fluorobenzene, p-dioxane, and cyclohexane.

31. (PREVIOUSLY PRESENTED) The lithium-sulfur battery of claim 10, wherein said first solvent is at least one selected from a group consisting of methanol, hexamethyl phosphoramidate, ethanol, and isopropanol.

32. (CURRENTLY AMENDED) The lithium-sulfur battery of claim 10, wherein the second solvent is between 70% and 80% inclusively ~~more than 70%~~ by volume of the electrolyte.

33. (CURRENTLY AMENDED) The lithium-sulfur battery of claim 10, wherein the first solvent is between 20% inclusively and 30% ~~less than 30%~~ by volume of the electrolyte.

34. (PREVIOUSLY PRESENTED) The lithium-sulfur battery of claim 10, wherein the second solvent is substantially 80% by volume of the electrolyte.

35. (PREVIOUSLY PRESENTED) The lithium-sulfur battery of claim 10, wherein the first solvent is substantially 20% by volume of the electrolyte.

36. (CURRENTLY AMENDED) The lithium-sulfur battery of claim 14, wherein the second solvent is between 70% and 80% inclusively ~~more than 70%~~ by volume of the electrolyte.

37. (CURRENTLY AMENDED) The lithium-sulfur battery of claim 14, wherein the first solvent is between 20% inclusively and 30% ~~less than 30%~~ by volume of the electrolyte.

38. (PREVIOUSLY PRESENTED) The lithium-sulfur battery of claim 14, wherein the second solvent is substantially 80% by volume of the electrolyte.

39. (PREVIOUSLY PRESENTED) The lithium-sulfur battery of claim 14, wherein the first solvent is substantially 20% by volume of the electrolyte.

40. (PREVIOUSLY PRESENTED) The lithium-sulfur battery of claim 14, wherein said first solvent is at least one selected from a group consisting of methanol, hexamethyl phosphoramidate, ethanol, and isopropanol.

41. (NEW) A lithium-sulfur battery comprising:
a positive electrode including an active material including lithium;
a negative electrode including another active material including sulfur; and
an electrolyte disposed between the positive and negative electrodes, the electrolyte comprising

at least a first solvent selected from a group consisting of ethylene carbonate, propylene carbonate, dimethyl sulfoxide, sulfolane, γ -butyrolactone, acetonitrile, dimethyl formamide, methanol, hexamethyl phosphoramidate, ethanol, and isopropanol;

at least a second solvent selected from a group consisting of methylethyl ketone, pyridine, methyl formate, tetrahydrofuran, diglyme (2-methoxyethyl ether), 1,3-dioxolane, methyl acetate, 2-methyl tetrahydrofuran, ethyl acetate, n-propyl acetate, ethyl propionate, methyl propionate, ethyl ether, diethyl carbonate, methylethyl carbonate, dimethyl carbonate, toluene, fluorotoluene, 1,2-dimethoxy ethane, benzene, fluorobenzene, p-dioxane, and cyclohexane; and
an electrolyte salt,

wherein

the first solvent is roughly between 20% and about 40% by volume of the electrolyte, and

the second solvent is roughly between 80% and about 60% by volume of the electrolyte.

42. (NEW) A lithium-sulfur battery comprising:

a negative electrode comprising a negative active material;

an electrolyte comprising

at least a first solvent selected from a group consisting of ethylene carbonate, propylene carbonate, dimethyl sulfoxide, sulfolane, γ -butyrolactone, acetonitrile, dimethyl formamide, methanol, hexamethyl phosphoramide, ethanol, and isopropanol,

at least a second solvent selected from a group consisting of methylethyl ketone, pyridine, methyl formate, tetrahydrofuran, diglyme (2-methoxyethyl ether), 1,3-dioxolane, methyl acetate, 2-methyl tetrahydrofuran, ethyl acetate, n-propyl acetate, ethyl propionate, methyl propionate, ethyl ether, diethyl carbonate, methylethyl carbonate, dimethyl carbonate, toluene, fluorotoluene, 1,2-dimethoxy ethane, benzene, fluorobenzene, p-dioxane, and cyclohexane, and

an electrolyte salt; and

a positive electrode comprising a positive active material,

wherein:

the first solvent is roughly between 20% and 80% by volume of said electrolyte,
and

the second solvent is roughly between 20% and about 80% by volume of said electrolyte.